

Different Treatment Modalities for Odontogenic Keratocysts of Jaws - A Clinical Study

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ABSTRACT

Background: Odontogenic cysts are relatively common lesions and account to form a major part of total biopsies received by any pathology service. This diverse group of lesions exhibits varying presentations ranging from a small innocuous lesion, which may be detected accidentally or may present as a highly aggressive and destructive lesion that may even transform into a malignancy. Among the latter type most notorious are odontogenic keratocyst (OKC). OKC is one of the rare odontogenic cysts, which attracts many researchers due to its unique characteristics. The treatment of OKC remains debatable. We have tried different treatment modalities in our department ranging from simple decompression to resection and found good results with most of the modalities. Since OKC exhibits a high recurrence rate of 5-15% of all odontogenic cysts, the ultimate goal of treatment should be complete, adequate removal of the cyst. Treatment should be based on so many parameters such as extent, age, aggressiveness and size of the lesions as seen in our study. **Methods:** 30 patients who reported to our department with histopathologically diagnosed odontogenic keratocysts were evaluated prospectively for different treatment modalities. **Results:** 15 patients underwent this procedure. **Conclusion:** Conservative surgical management of Odontogenic Keratocyst (OKC) with combined therapy using multimodal therapeutic approaches was shown to be a good alternative to resection in OKC. Therefore, an appropriate long-term follow-up must be done after the treatment is performed in order to ensure clinical success is described as an absence of signs of recurrent disease.

Keywords: Odontogenic keratocyst, Treatment modalities.

INTRODUCTION

Odontogenic keratocyst (OKC) is the relatively most common and most aggressive developmental odontogenic cyst of the jaw. Philipsen in 1956 first described this cyst and Pinborg and Hansen suggested the histopathological importance for the diagnosis of OKC in 1962. It was initially called as primordial cyst as tooth primordium was thought to be the origin of the lesion. It is commonly believed that the origin of OKC comes from dental lamina remnants in the maxilla and mandible another origin of OKC is from Basel cells of oral epithelium overlying it. Odontogenic keratocyst occurs as unilocular or multilobular radiolucency often with the dentigerous cyst. It comprises of around 11% of all cysts of jaws. The histological characteristics are very thin orthokeratinized or parakeratinized stratified squamous epithelium, well-defined Basel cell layer without rete pegs, lumen containing desquamated keratin and fibrous capsule. In 97% of OKC parakeratinized squamous epithelial lining is seen.⁸ Daughter or satellite cysts are seen in connective tissue walls.

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The cystic lining is thin, fragile, and difficult to enucleate in one piece. In 1960, Gorlin and Goltz described the simultaneous occurrence of multiple Basel cell carcinomas, multiple OKCs of the mandible and maxilla bifid ribs, and other changes.^[1] Treatments are generally classified as conservative or aggressive. Conservative treatment generally includes simple enucleation, with or without curettage, or marsupialization. Aggressive treatment generally includes peripheral ostectomy, chemical curettage with Carnoy's solution, cryotherapy, or electrocautery and resection. The goal is to choose the treatment modality that carries the lowest risk of recurrence and the least morbidity.^[2] Eyre and Zakrezewska in 1985, have stated the following treatment modalities for OKC/KOT.^[3] Enucleation• With primary closure• With packing• With chemical fixation• With cryosurgery• Marsupialization• Only• Followed by enucleation• Resection•

MATERIALS AND METHODS

30 patients who reported to our department with histopathologically diagnosed odontogenic keratocysts were evaluated prospectively for different treatment modalities.

RESULTS & DISCUSSION

Decompression and Marsupialization: 15 patients underwent this procedure. Decompression of a cyst involves any technique that relieves the pressure within the cyst as this pressure is the way by which the cyst grows by expansion. Decompression was performed by making a small opening in the cyst and keeping it open with a drain. Marsupialization, on the other hand, involved converting the cyst into a pouch so the cyst is decompressed, but this is a more definitive treatment than decompression as it exposes the cyst lining to the oral environment. Mandibular cysts were mercurialized into the oral cavity, while maxillary cysts were mercurialized into the maxillary sinus or nasal cavity, as well as the oral cavity. Although decompression or marsupialization was not recommended as a treatment for the OKC by some authors, because it was thought that the pathologic tissue would be left in situ, decompression or marsupialization has been recommended in a number of studies as a technique that allows a partial decrease in size in the OKC so that vital structures like teeth or the inferior alveolar nerve can be preserved, then the OKC was certainly enucleated as was seen in our study.^[4-7] The resulting cystic cavity was packed with iodoform gauze impregnated with bacitracin ointment to minimize the risk of recurrence in each recall visit. The benefit of this protocol lies in the minimal surgical morbidity, decreased incidence of damage to associated structures such as the inferior alveolar nerve and developing teeth.^[8] In his study, Voorsmit has proven that marsupialization followed by enucleation has no significant recurrence rate. Furthermore, Voorsmit et al. in their 1981 study, established that enucleation with Carnoy's solution has a recurrence rate as low as 2.7% compared to 13.5% for an isolated enucleation. It was Stoelinga who insisted that the removal of the overlying alveolar mucosa that forms the roof of the cystic cavity eliminates the presence of daughter cysts between the cyst lining and the alveolar mucosa.^[9,10]

Enucleation with and Without Adjuncts: This was done in 3 patients. Enucleation with and without various adjuncts has been utilized for many years. Although enucleation/curettage has the advantage over marsupialization of providing a complete specimen for histopathologic analysis, it shows recurrence rates as high as 62.5%, which is no longer an acceptable treatment modality. 2 out of 3 patients reported with recurrence. This high incidence of recurrence is explained by the thin, friable wall of the OKCT, which is often difficult to enucleate from the bone in one piece, and the small satellite cysts within the fibrous wall. Many clinicians consider enucleation and curettage as the

minimal requirement in the treatment of OKC.^[11,12]

Enucleation and Treatment of the Bony Defect with Carnoy Solution:

This modality was tried in 10 patients. As a result of the difficulty of enucleating the thin, friable wall of the KCOT as one piece, and due to the small satellite cysts, therefore, treatment should aim to eliminate the possible vital cells left behind in the defect. For this reason a mild, not deeply penetrating, the cauterizing agent is used such as Carnoy's solution {consists of 3 ml of chloroform, 6 ml of absolute ethanol, 1 ml of glacial acetic acid and 1 g of ferric chloride}. In case the cyst has penetrated through the lingual or buccal cortex, the authors described the use of electrocautery to avoid a recurrence in the soft tissues.^[13] Chemical cauterization with Carnoy's solution is used since 1933 and showing the lowest rate of recurrence and low morbidity as compared to recurrence. Modified Carnoy's solution is used nowadays because of the carcinogenicity of chloroform in order preparation. According to an animal study depth of penetration of carboys solution in cancellous bone is 1.0-0.54 mm. Carnoy's solution must not be applied to the vital structure for more than 3min. As literature accepts the enucleation of OKC as a least accepted modality for treatment due to higher recurrence but in the present case the treatment modality used was enucleation only and follow-up was done for 5 yr with no recurrence in the follow-up period.^[14] According to Blanas N et al., simple enucleation was reported to have a recurrence rate of 17% to 56% while simple enucleation combined with adjunctive therapy, such as the application of Carnoy's solution or decompression before enucleation, was reported to have recurrence rates of 1% to 8.7%.^[12,13] The use of Carnoy's solution in combination with peripheral ostectomy may increase its safety margins and compensate for its deficiency when lesions are near soft tissues and between dental roots. Chow and Morgan et al demonstrated low recurrences (4.3% and 0%, respectively) when this combination of therapies was applied, but these authors did not specify the follow-up period that was used.^[14,15]

Enucleation and Liquid Nitrogen Cryotherapy:

Theoretically, the ideal treatment for the KCOT would be enucleation or curettage followed by treatment of the cavity with an agent that would kill the epithelial remnants of satellite cysts. In addition, the osseous framework should be left intact to allow for osteoconduction. Liquid nitrogen has the ability to devitalize bone in situ while leaving the inorganic framework untouched, as a result of this, cryotherapy has been used for a number of locally aggressive jaw lesions, including KCOT, ameloblastoma and ossifying fibroma. Cell death with cryosurgery occurs by direct damage

from intracellular and extracellular ice crystal formation plus osmotic and electrolyte disturbances.^[16,17]

Block Resection, With Preservation of the Continuity of the Jaw: This was done in 2 patients. Resection refers to either segmental resection (surgical removal of a segment of the mandible or maxilla without maintaining the continuity of the bone) or marginal resection (surgical removal of a lesion intact, with a rim of unininvolved bone, maintaining the continuity of the bone) which is an extreme technique, that results in considerable morbidity, particularly because reconstructive measures are necessary to restore jaw function and aesthetics.^[18-23]

CONCLUSION

Conservative surgical management of Odontogenic Keratocyst (OKC) with combined therapy using multimodal therapeutic approaches was shown to be a good alternative to resection in OKC. Therefore, an appropriate long-term follow-up must be done after the treatment is performed in order to ensure clinical success is described as an absence of signs of recurrent disease.

REFERENCES

1. Lone PA, Singh M, Johar HS. Treatment Modalities of Odontogenic Keratocyst of Maxilla and Mandible: Our Experience. World J Dent 2015;6(4):208-212.
2. Abdullah WA. Surgical treatment of keratocystic odontogenic tumour: A review article. Saudi Dent J. 2011;23(2):61-5.
3. Eyre J, Zakrezewska JM. The conservative management of large odontogenic keratocysts. Br J Oral Maxillofac Surg. 1985;23:195-203
4. Chirapathomsakul D., Sastravaha P. A review of odontogenic keratocysts and the behavior of recurrences. Oral Surg. Oral Med. Oral Pathol. Oral Radiol. Endod. 2006;101:5-9.
5. Schmidt B.L., Pogrel M.A. The use of enucleation and liquid nitrogen cryotherapy in the management of odontogenic keratocysts. J. Oral Maxillofac. Surg. 2001;59:720.
6. Emmings F.G., Neiders M.E., Greene G.W. Freezing the mandible without excision. J. Oral Surg. 1966;24:145. Quoted from Schmidt, B.L., Pogrel, M.A., 2001. The use of enucleation and liquid nitrogen cryotherapy in the management of odontogenic keratocysts. J. Oral Maxillofac. Surg. 59, 720.
7. Seward M.H., Seward G.R. Observations on Snawdon's technique for the treatment of cysts in the maxilla. Br. J. Oral Surg. 1969;6:149.
8. Yildirim G, Ataoglu H, Kalayci A, Ozkan BT, Kucuk K, Esen A. Conservative treatment protocol for keratocystic odontogenic tumour: A follow-up study of 3 cases. J Oral Maxillofac Res 2010;1:e7
9. The management of keratocysts. Voorsmit RA, Stoelinga PJ, Van Haelst UJ. http://<https://www.ncbi.nlm.nih.gov/pubmed/6172530> J Maxillofacial Surg. 1981;9:228-236.
10. Excision of the overlying, attached mucosa, in conjunction with cyst enucleation and treatment of the bony defect with Carnoy solution. Stoelinga PJ. Oral Maxillofac Surg Clin North Am. 2003;15:407-414
11. BP RajeshKumar, et al. "Carnoy's in Aggressive Lesions: Our Experience". Journal of Oral and Maxillofacial Surgery 12.1 (2013): 42-47.
12. Walid Ahmed Abdullah. "Surgical treatment of keratocystic odontogenic tumour: A review article". The Saudi Dental Journal 23 (2011): 61-65.
13. Blanas N, Freund B, Schwartz M, Furst I.M. Systematic review of the treatment and prognosis of the odontogenic keratocyst. Oral Surg. Oral Med. Oral Pathol. Oral Radiol. Endod. 2000;90:553.
14. Chow HT. Odontogenic keratocyst: a clinical experience in Singapore. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 1998;86(5):573-7.
15. Morgan TA, Burton CC, Qian F. A retrospective review of treatment of the odontogenic keratocyst. J Oral Maxillofac Surg. 2005;63(5):635-9.
16. Meiselman F. Surgical management of the odontogenic keratocyst: conservative approach. J. Oral Maxillofac. Surg. 1994;52:960.
17. Nakamura N., Mitsuyasu T., Mitsuyasu Y. Marsupialization for odontogenic keratocysts: long-term follow-up analysis of the effects and changes in growth characteristics. Oral Surg. Oral Med. Oral Pathol. Oral Radiol. Endod. 2002;94:543.
18. Pogrel M.A., Jordan R.C.K. Marsupialization as a definitive treatment for the odontogenic keratocyst. J. Oral Maxillofac. Surg. 2004;62:651-655.
19. Pogrel M.A. Treatment of keratocysts: the case for decompression and marsupialization. J. Oral Maxillofac. Surg. 2005;63:1667-1673.
20. Salmassy D.A., Pogrel M.A. Liquid nitrogen cryosurgery and immediate bone grafting in the management of aggressive primary jaw lesions. J. Oral Maxillofac. Surg. 1995;53:784.
21. Rosen G., Vered I.Y. Cryosurgery for basal cell carcinoma of the head and neck. S. Afr. Med. J. 1979;56:26.
22. Quoted from Schmidt, B.L., Pogrel, M.A., 2001. The use of enucleation and liquid nitrogen cryotherapy in the management of odontogenic keratocysts. J. Oral Maxillofac. Surg. 59, 720.
23. Rogerson K.C. Gorlin's syndrome: an update on diagnosis and management. Oral Maxillofac. Clin. North Am. 1991;3:155.
24. Zhang L., et al. "Inhibition of SHH signaling pathway: molecular treatment strategy of odontogenic keratocyst". Med Hypotheses 67.5 (2006): 1242-1244.
25. Cha YH., et al. "Frequent oncogenic BRAF V600E mutation in odontogenic keratocyst". Oral Oncology 74 (2017): 62-67
26. Yildirim G, Ataoglu H, Kalayci A, Ozkan BT, Kucuk K, Esen A. Conservative treatment protocol for keratocystic odontogenic tumour: A follow-up study of 3 cases. J Oral Maxillofac Res. 2010;1:e7.

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